

THE CLAIMS DEFINING THE INVENTION ARE AS FOLLOWS:

1. A method for selectively enriching for a microorganism able to metabolise a test substrate, and/or the enrichment of an enzyme involved in the metabolism of the test substrate, the method comprising the steps of
 - a) providing a population of microorganisms in a vessel,
 - b) feeding fluid into the vessel at a controlled flow rate commencing with an initial flow rate, the fluid comprising a nutrient medium and, for at least part of the feed period, the test substrate,
 - c) producing a signal indicative of the level of a metabolism indicator over the time-frame of the enrichment, and
 - d) providing an output based on the signal to enable assessment of selective enrichment of a microorganism that metabolises the test substrate, and/or the enrichment of an enzyme produced by the microorganism that is involved in the metabolism of the test substrate.
2. The method of claim 1, wherein the output is produced electronically directly from the signal, such that the output is provided on-line.
3. The method of claim 1 or claim 2, wherein the method further comprises presetting conditions to be met by the signal output to result in a change in the fluid flow rate, and changing the flow rate at which fluid is fed into the vessel when the conditions are met, wherein the preset conditions are a combination of a predetermined period of time and a preset value range within which the signal must remain for the predetermined period of time.

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4. The method of claim 3, wherein the fluid flow rate is increased when the preset conditions are met.
5. The method of claim 4, wherein the fluid flow rate is increased by proportionally increasing the flow rate of both the nutrient medium and the test substrate.
6. The method of any one of claims 1 to 4, wherein the metabolism indicator is the uptake or release of a molecule involved in metabolism of the test substrate.
7. The method of claim 6, wherein the metabolism indicator is selected from the uptake or release of oxygen, carbon dioxide, carbonate, sulphate, sulphur, nitrate, fumarate or iron.
8. The method of claim 6, wherein the metabolism indicator is selected from the uptake or release of oxygen, sulphate, sulphur, nitrate, fumarate or iron.
- 20 9. The method of claim 6, wherein the metabolism indicator is the uptake or release of oxygen, and the signal is produced by an oxygen probe.
- 25 10. The method of any one of claims 1 to 9, wherein the output based on the signal of the level of the metabolism indicator is a visual output.
- 30 11. The method of claim 10, wherein the signal of the level of metabolism indicator is provided as a visual output of the metabolism indicator versus time.
12. The method of claim 10 or claim 11, wherein the visual output is updated in periods of duration of 20 minutes or less.

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13. The method of claim 10 or claim 11, wherein the visual output is updated in periods of duration of 10 minutes or less.

5 14. The method of any one of claims 1 to 13, wherein the population of microorganisms is a heterogeneous population.

10 15. The method of claim 14, wherein the population of microorganisms contains at least 10 different species of microorganisms.

16. The method of claim 14, wherein the population of microorganisms is activated sludge.

15 17. The method any one of claims 1 to 13, wherein the population of microorganisms is homogeneous.

20 18. The method of any one of claims 1 to 17, the method further comprising the step of isolating the enriched microorganism, or isolating the enriched enzyme.

19. The method of any one of claims 1 to 18, wherein the test substrate is not a commonly metabolised substrate.

25 20. The method of any one of claims 1 to 19, wherein the test substrate is an organic carbon-containing molecule other than glucose or acetate.

30 21. The method of any one of claims 1 to 20, wherein one, two or all of the conditions in the vessel selected from the pH, temperature and aeration conditions are set by the user prior to commencement of the feeding of test substrate into the vessel.

35 22. The method of any one of claims 1 to 21, wherein a selective pressure is applied to the contents of the

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vessel to select for a microorganism and/or enzyme that is enriched under the conditions of the selective pressure.

23. The method of claim 22, wherein the selective
5 pressure is selected from one or more of an increase or decrease in pH, temperature, aeration, salt concentration, dissolved gas content, and presence or absence of a chemical compound.

10 24. The method of claim 22, wherein the microorganism enriched by the method tolerates elevated or reduced temperatures.

15 25. A microorganism or enzyme enriched or isolated by the method of any one of claims 1 to 24.